

AMENDMENTS TO THE CLAIMS

1. (currently amended): A method of separating a solid phase and a liquid phase in an oil-based mud comprising the steps of:

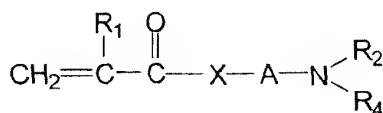
(i) contacting said oil-based mud with a water-in-oil emulsion comprising a polymer derived from at least one water-soluble monomer, wherein said polymer is not dissolved prior to contact with said oil-based mud ~~and wherein the~~ emulsion comprises polymer particles of average discrete phase particle size of the polymer is less than about 10 microns;

(ii) mixing said water-in-oil emulsion and said oil-based mud;

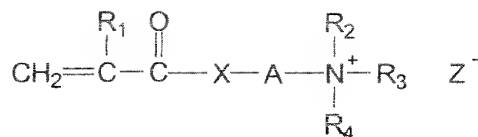
(ii) separating the solid phase and the liquid phase.

2. (original): The method of claim 1, wherein said monomer is a water-soluble vinyl monomer.

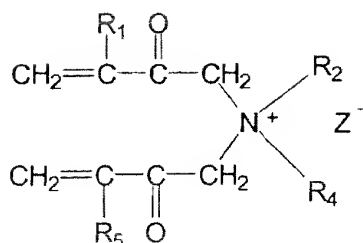
3. (currently amended): The method of claim 1, wherein said at least one water soluble monomer is selected from (alkyl)acrylamide, (alkyl)acrylic acid, N-vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, ~~fumaric~~ fumaric acid, crotonic acid, maleic acid, hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl group contains 1 to 6 carbon atoms, styrene sulfonic acids; and salts of any of the foregoing thereof; or monomers having the structure of formulas I, II, or III



Formula I



Formula II



Formula III

wherein R₁, R₂, and R₅ are each independently hydrogen or a C₁ to C₆ alkyl; R₃ and R₄ are each independently hydrogen, a C₁ to C₁₂ alkyl, aryl, arylalkyl or hydroxyethyl; and R₂ and R₄ or R₂ and R₃ can combine to form a cyclic ring containing one or more hetero atoms; Z is the conjugated base of an acid, X is oxygen or -NR₆ wherein R₆ is hydrogen or a C₁ to C₆ alkyl; and A is a C₁ to C₁₂ alkylene.

4. (original): The method of claim 2, wherein said at least one water-soluble vinyl monomer is selected from the group consisting of (alkyl)acrylamide, (alkyl)acrylic acid and its salts and vinyl sulfonic acid.

5. (currently amended): The method of claim 3, wherein said polymer is a copolymer of an (alkyl)acrylamide monomer and at least one second monomer selected from N-vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, acrylic acid, methacrylic acid, ethylacrylic acid, ~~fumaric~~fumaric acid, crotonic acid, maleic acid, hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl group contains 1 to 6 carbon atoms, styrene sulfonic acids, vinyl sulfonic acid; and salts of any of the foregoing thereof; or monomers of Formulas I, II or III.

6. (original): The method of claim 3, wherein said polymer is a copolymer of (meth)acrylamide and at least one second monomer selected from the group consisting of N,N-dimethylaminoethyl(meth)acrylate or its salts, quaternary N,N-dimethylaminoethyl(meth)acrylates, tertiary or quaternary N,N-dimethylaminopropyl acrylamides, tertiary or quaternary N,N-dimethylaminomethyl acrylamides and diallyl dimethyl ammonium halides.
7. (original): The method of claim 1, wherein said polymer is anionic and is derived by copolymerization of (meth)acrylamide and (meth)acrylic acid.
8. (original): The method of claim 1, wherein said polymer is anionic and is derived by hydrolysis.
9. (original): The method of claim 1, wherein said polymer is branched or crosslinked.
10. (original): The method of claim 1, wherein the concentration of said polymer in said water-in-oil emulsion is about 10% to about 70% by weight based on the total weight of the emulsion.
11. (original): The method of claim 1, wherein said water-in-oil emulsion is pre-dispersed with oil before contacting with the oil-based mud.
12. (original): The method of claim 11, wherein the concentration of said polymer in said water-in-oil emulsion is about 0.1% to about 10% by weight based on the total weight of the emulsion.
13. (original): The method of claim 1, further comprising the addition of an emulsifier, surfactant or optionally water.
14. (original): The method of claim 13, wherein said surfactant is a sulfosuccinates and/or a sulfosuccinamate.
15. (original): The method of claim 14, wherein said sulfosuccinates is dioctylsulfosuccinate, and said sulfosuccinamate is dicarboxyethyl octadecylsulfosuccinamate, or mixtures thereof.

16. (original): The method of claim 13, wherein said the oil-based mud is contacted with the emulsifier, surfactant or optionally water prior to contact with the water-in-oil emulsion.

17. (original): The method of claim 1, wherein said separating the solid phase and the liquid phase is conducted by mechanical or gravitational separation.

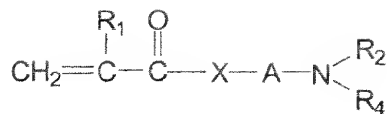
18. (original): The method of claim 17, wherein said mechanical separation is conducted by a centrifuge, cyclone, pressure filtration or vacuum assisted filtration, and wherein said gravitational separation is conducted by a clarifier, thickener or continuous countercurrent decantation.

19. (original): The method of claim 1, wherein said mixing is conducted using a flow mixer, inline mixer, gas agitation or mechanical mixer.

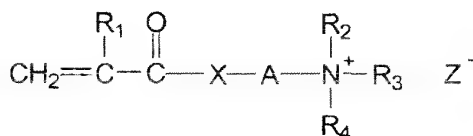
20. (original): The method of claim 11, wherein said pre-dispersed oil is kerosene, diesel, paraffin blends, internal olefins or C₁₆-C₁₈ alkene blends.

21. (original): The method of claim 1, wherein said oil-based mud is an oil-based drilling mud.

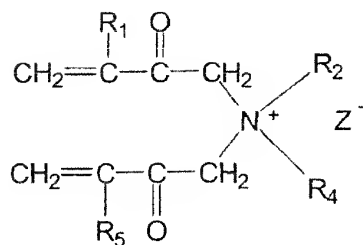
22. (currently amended): The method of claim 21, wherein said at least one water soluble monomer is selected from (alkyl)acrylamide, (alkyl)acrylic acid, N-vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, ~~fumaric~~-fumaric acid, crotonic acid, maleic acid, hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl group contains 1 to 6 carbon atoms, styrene sulfonic acids; and salts of any of the foregoing thereof; or monomers having the structure of formulas I, II or III



Formula 1



Formula II



Formula III

wherein R₁, R₂ and R₅ are each independently hydrogen or a C₁ to C₆ alkyl; R₃ and R₄ are each independently hydrogen, a C₁ to C₁₂ alkyl, aryl, arylalkyl or hydroxyethyl; and R₂ and R₄ or R₂ and R₃ can combine to form a cyclic ring containing one or more hetero atoms; Z is the conjugated base of an acid, X is oxygen or -NR₆ wherein R₆ is hydrogen or a C₁ to C₆ alkyl; and A is a C₁ to C₁₂ alkylene.

23. (original): The method of claim 21, wherein said at least one water-soluble vinyl monomer is selected from the group consisting of (alkyl)acrylamide, (alkyl)acrylic acid and its salts and vinyl sulfonic acid.

24. (currently amended): The method of claim 22, wherein said polymer is a copolymer of an (alkyl)acrylamide monomer and at least one second monomer selected from N-vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, acrylic acid, methacrylic acid, ethylacrylic acid, ~~maleic~~ fumaric ~~fumaric~~ acid, crotonic acid, maleic acid,

hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl group contains 1 to 6 carbon atoms, styrene sulfonic acids, vinyl sulfonic acid; and salts of any of the foregoing thereof; or monomers of Formulas I, II or III.

25. (original): The method of claim 21, wherein said polymer is a copolymer of (meth)acrylamide and at least one second monomer selected from the group consisting of N,N-dimethylaminoethyl(meth)acrylate or its salts, quaternary N,N-dimethylaminoethyl(meth)acrylates, tertiary or quaternary N, N-dimethylaminopropyl acrylamides, tertiary or quaternary N,N-dimethylaminomethyl acrylamides and diallyl dimethyl ammonium halides.

26. (currently amended): A composition comprising an oil-based mud with a water-in-oil emulsion comprising a continuous oil phase and a discontinuous aqueous phase which is in the form of droplets or particles containing a polymer derived from at least one water-soluble monomer, wherein said polymer is not dissolved prior to contact with said oil-based mud ~~and wherein the discontinuous aqueous phase comprises polymer particles of average discrete phase particle size of the polymer is less than about 10 microns.~~

27. (original): The composition of claim 26, further comprising an emulsifier, surfactant and optionally water.

28. (original): The composition of claim 26, wherein said composition is well-dispersed.